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Developing Deep Understanding about Language in Undergraduate Pre-service Teacher Programs through the Application of Knowledge

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Developing Deep Understanding about Language in Undergraduate Pre-service Teacher Programs through the Application of Knowledge

The development of deep understanding of theoretical knowledge is an essential element of successful tertiary-programs that prepare individuals to enter professions. This study investigates the extent to which an emphasis on the application of knowledge within curriculum design, teaching strategies and assessment methods developed deep knowledge about language within the first year of a tertiary-based teacher education program in Australia. Concepts of application from literature on tertiary-based learning informed the design of curriculum, teaching strategies and assessment within a unit on linguistics for pre-service teachers. Questionnaires, provided to students at the end of the unit, and analysis of a final assessment task, provided insight into the extent to which the strategies designed to develop deep understanding were successful. The results indicate that an emphasis on the application of knowledge, within a discipline context, can support the development of understanding in units that do not have immediate links with professional practice.

Keywords: knowledge about language; undergraduate education; teacher education; teaching methods

Current research into tertiary teacher education programs emphasises the importance of developing deep knowledge. Pre-service teachers who do not have sophisticated understanding of abstract theory will struggle to apply ideas in practice (Darling-Hammond 2006). The most successful teacher education programs produce graduates who can engage with ideas and concepts and are then able to apply theory flexibly in a diverse range of contexts (Darling-Hammond 2006; Loughran 2006; Zeichner 2008; Milner 2005; Poplin and Rivera 2005). School teachers who will make a difference to student outcomes have developed ‘deep and flexible knowledge of subject matter’ that can be applied to assess

students' abilities and develop a range of appropriate teaching practices that support learning (Darling-Hammond 2000, 167).

Superficial knowledge, which is purely declarative, is not valued within teacher education programs or more generally at the tertiary level. Undergraduate and postgraduate courses aim to provide students with sophisticated understanding of the concepts relevant to a field of study (Ramsden 2003; Biggs and Tang 2007). Knowledge, when deeply understood, can be transferred and applied in new contexts and manipulated to solve problems in innovative ways (McKay and Kember 1997; Ramsden 2003; Biggs and Tang 2007). Students who develop deep understanding of the content of a discipline can manipulate detail within different levels of conceptual frameworks and make the connections required to apply technical skills effectively and flexibly (Ramsden 2003; Biggs and Tang 2007). In all courses linked with specific professions, students require an understanding of abstract concepts, which then allows them to apply knowledge effectively within specific and complex professional environments (Garraway et al. 2011; Peach 2010; Boulton-Lewis 1998; Ramsden 2003; Schwandt 2005).

Previous research in the field of higher education suggests that the articulated goal of deep knowledge will only be achieved if curriculum, assessment and teaching approaches are planned with this aim in mind (Ramsden 2003; Biggs and Tang 2007; Boulton-Lewis 1998; McKay and Kember 1997; Saltmarsh and Saltmarsh 2008; James, Hughes and Cappa 2010). Course objectives, learning activities and assessment tasks need to focus on developing conceptual understanding and be closely aligned (Biggs and Tang 2007; Hawe 2007; McKay and Kember 1997). The design of tasks for students, including those undertaken within classes and used for assessment, is a crucial aspect of supporting the development of sound understanding. Tasks need to take students beyond the superficial learning of facts and processes (Boulton-Lewis 1998; Ramsden 2003; Biggs and Tang 2007). Students'

understanding will deepen if tasks require them to make connections between aspects, relate factual knowledge to broader concepts, make links with prior learning and reorganise material to create new coherent forms (Ramsden 2003; Biggs and Tang 2007). Previous research in tertiary learning environments suggests that tasks requiring the application of knowledge are more likely to involve the kinds of cognitive processes that move beyond superficial understanding (Biggs and Tang 2007; Ramsden 2003). Tertiary learning environments that aim to provide students with a knowledge base and constantly offer challenging opportunities to apply the learnt information result in thorough conceptual knowledge (McKay and Kember 1997; Biggs and Tang 2007; Ramsden 2003).

Studies related specifically to teacher education support the findings presented in recent years within general literature on higher education. Deeper learning is obtained when teacher educators design tasks that require the application of theoretical knowledge (Darling-Hammond 2006). Often, in teacher education, as well as other studies of education for the profession, application of knowledge is conceptualised as using theory in practice, usually during field placement experiences (e.g. Darling Hammond 2000; Darling Hammond 2006; McKay and Kember 1997; Maxwell 2012). However, teacher education programs often include units that have a focus on content knowledge, such as linguistics. It is only during units and placements later in the degree that the pre-service teachers have opportunities to apply knowledge to their developing teaching practices. However, literature from the general field of tertiary education suggests that application of knowledge, with the aim of developing understanding, does not necessarily need to involve immediate use within professional practice. Tasks requiring the application of knowledge within the context of the specific content area can also be used constantly during learning programs that are focused on the transmission of knowledge (Boulton-Lewis 1998; Ramsden 2003; Biggs and Tang 2007). In

this study, the notion of knowledge application within a content area informed a learning program designed to develop pre-service teachers' deep knowledge about language.

Knowledge about Language in Pre-service Teacher Education Programs

The successful transmission of knowledge about language to pre-service teachers is of current concern for teacher educators around the world. Within Australia, and in other developed countries, the tendency of schooling to reproduce inequality is being highlighted by governments. The movement towards knowledge economies has prompted national leaders to link future prosperity and wellbeing to better outcomes for groups of students who traditionally do not succeed within the school system (Ministerial Council on Education, Employment, Training and Youth Affairs [MCEETYA] 2008; Centre for Education Research and Innovation [CERI] 2006; The Organisation for Economic Co-operation and Development [OECD] 2010). The attainment of literacy and numeracy skills is a current focus of governments seeking to improve the outcomes of schooling and further training for students (OECD 2010). The emphasis on literacy skills is supported by theorists working in the field of the sociology of education who demonstrate how schools reproduce inequality. Students from low socio-economic and ethnic minority backgrounds tend not to have the linguistic and cultural capital valued within formal school contexts (Bourdieu and Passeron 1990; Teese and Polesel 2003; Lingard, Mills and Hayes 2000). Growing expectations associated with the role of teachers in improving equity outcomes are influencing teacher education programs. Within the current climate, evaluations of courses preparing future teachers increasingly focus on the extent to which graduates can improve achievement for all learners in diverse school settings (Darling-Hammond 2006; Aspland 2008; Zeichner 2008).

To be able to contribute to an equity agenda, teachers new to the profession will require a range of understandings and skills, including deep knowledge about language. Current research suggests that student learning in schooling is supported when teachers are explicit and clear about curriculum goals and they are then able to use a broad range of strategies to develop all students' learning (Hattie 2012; Darling-Hammond 2006; Abu El-Haj and Rubin 2009; Poplin and Rivera 2005). Part of this work involves teachers being able to analyse the linguistic requirements specified by curriculum and to facilitate student development of the language skills required in curriculum areas (Derewianka 2012; Love 2010; Schleppegrell, Greer and Taylor 2008; Hammond 2008; Coffin 2006; May and Wright 2007; Lewis and Wray 1999). Both capacities are reliant on knowledge about language.

Previous studies have found that explicit teaching about language supports learners to achieve within specific discipline areas (e.g. Coffin 2006; Folkeryd 2006; Martin 2010; Schleppegrell, Greer and Taylor 2008; May and Wright 2007). Students experiencing classrooms that include some explicit focus on language are more able to access the content of the learning area and produce knowledge in an appropriate form. For example, Schleppegrell, Greer and Taylor (2008) found that teaching students about the kind of language used in the discipline of history during history lessons in the US supported students with their written tasks and helped them to understand the concepts involved. Another study, also within the discipline area of history, found that incorporating language learning supported students to access and produce the kinds of texts relevant to a specific subject area (Coffin 2006). Other studies have demonstrated that explicit teaching of language in curriculum areas enabled students learning English as an additional language to access the curriculum and achieve at challenging tasks (e.g. Hammond 2008; Saracini-Palombo and Custance 2011). Students who are struggling to read age-appropriate texts across the

curriculum are also supported in their learning when teachers explicitly focus on language use in context (e.g. Moats 2001).

The new Australian Curriculum includes an emphasis on language teaching across the curriculum and presents the position that explicit teaching about language will support student achievement in all learning areas. The general capability of 'Literacy' in the new curriculum states that '[l]iteracy involves students in listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts' (Australian Curriculum Assessment and Reporting Authority [ACARA] 2013, Introduction). An overview for the general capability continues to state that '[s]uccess in any learning area depends on being able to use the significant, identifiable and distinctive literacy that is important for learning and representative of the content of that learning area' (ACARA 2013, Introduction). Similarly, the new professional standards for teachers in Australia require that graduates of teacher education programs can respond to 'the learning strengths and needs of students from diverse linguistic… backgrounds' (Australian Institute for Teaching and School Leadership [AITSL] 2013, Graduate Teachers). To achieve this aim, graduate teachers are expected to '[k]now and understand literacy and numeracy teaching strategies and their application in teaching areas' (AITSL 2013, Graduate Teachers). Both the new Australian Curriculum and the professional standards for graduate teachers in Australia emphasise the importance of teachers being able to teach about language and literacy within discipline contexts.

The capacity to support students' language learning within learning area contexts requires teachers themselves to have sophisticated knowledge about language. Studies from the UK, US and Australia have reported that teachers often feel that they do not have enough knowledge about language to be able to incorporate it successfully into their teaching. In the

UK, past studies have found that generally teachers working in their discipline contexts do not incorporate explicit literacy teaching into their lessons (Lewis and Wray 1999; Lewis and Wray, 2000). Similarly, studies within Australia have reported that teachers often feel they do not know enough about language to be able to teach it explicitly (Jones and Chen, 2012; Harper and Rennie, 2009; Hammond, 2008; Hammond and Macken-Horarik, 2001). Until recently, with the implementation of the new Australian Curriculum, 'explicit knowledge about language has been often absent from the English curricula' in schools (Derewianka, 2012, p.127). As a result, pre-service teachers beginning their tertiary studies often do not bring with them from schooling a detailed knowledge about language. In the US it has also been found that teachers often do not know enough about language to be able to intervene effectively and support learners who struggle with reading, which has promoted calls for changes to teacher education programs and more opportunities for professional learning in the area of language (Moats 2009).

Research is now required that investigates the kind of curriculum design, as well as the teaching, learning and assessment strategies, that tertiary educators can use to support the development of deep knowledge about language in teacher education programs. This study analyses the extent to which strategies involving the application of knowledge within a disciplinary context supported successful learning about language within the first year of an undergraduate program preparing teachers for employment in primary schools.

The Context of this Study

This study developed directly from the recent teaching experiences of the researchers. The four academics involved in this research had recent experience involving the teaching of linguistics within pre-service teacher education programs. Their personal experiences, across

3 different campuses, had led them to conclude that the pre-service teachers often began units on linguistics with little knowledge about language. In addition, the pre-service teachers often expressed a lack of confidence about their language knowledge. The researchers also observed that the knowledge about language that the pre-service teachers gained within a unit on linguistics was often not deep enough to be readily transferred to other contexts. For example, within subsequent units, the pre-service teachers often did not use their newly acquired knowledge about language to analyse curriculum demands. The researchers concluded that more strategies needed to be used within the linguistics unit to deepen understanding.

During the 12-week unit, the pre-service teachers learnt about two systems of language, including traditional and functional grammar. Traditional grammar concerns accuracy and correctness in the use of language, while functional grammar emphasises the use of appropriate forms of language in specific contexts. 'While traditional grammar was typically taught in decontextualised ways, a functional model sees an intimate relationship between context and the language system' (Derewianka 2012, p.130). Learning about functional grammar involved a system of language known as Systemic Functional Linguistics (SFL). SFL is based on the work of the linguist M.A.K. Halliday, who emphasises the ways in which social and cultural contexts, as well as more specific situations, affect language use (Halliday 2009; Halliday and Matthiessen, 1999). His theory proposes that the ways in which creators of texts use language to express ideas, define relationships and generate cohesion will be affected by the context in which the text is being created (Halliday 2009; Halliday and Matthiessen, 1999). The functional model of language is ideally suited to the teaching of language within learning areas. It can be used by teachers to interpret language demands within specific curriculum areas and to teach explicitly language appropriate for particular subjects. Most of the activities that the pre-service teachers engaged in during the 12-week

semester unit on linguistics involved the application of knowledge about the functional model of grammar.

The sequence of topics during the semester involved the teaching of traditional grammar first, followed by learning about the functional grammar model. During the teaching of functional grammar, any possible connections were made with the prior learning about traditional grammar and then the students learnt how the functional model often extends ideas and concepts so that language use in context can be identified and discussed. For example, the pre-service teachers learnt about 'processes' in the functional model, which, they were told, are the same as 'verbs' in traditional grammar. The students were then taught about different kinds of processes in the functional model and how texts with particular purposes will include an emphasis on specific types. During the 12-week semester, 2 weeks were spent on traditional grammar and 6 weeks on the functional model. Other topics covered during the linguistics unit included early language acquisition, learning English as an additional language and the relationship between oral and written language.

Strategies involving the application of knowledge about language in a discipline context informed the curriculum design, teaching practices and assessment strategies within a first-year unit on linguistics for pre-service teachers. Teaching and learning strategies used during lectures and tutorials during the 12 weeks aimed to develop deep understanding by constantly moving between the transmission and application of knowledge about language. Information about language was provided through weekly readings and lectures. Short tasks, asking the pre-service teachers to work with the people next to them to apply knowledge to create analyses of short written texts, were interspersed throughout the lectures. For example, an application task within one lecture related to the positioning of processes/verbs within different kinds of texts. The students were first asked to read a short procedural recipe text and to discuss with the people around them the kinds of processes that had been used, as well

as where the processes had been situated and why they believed this to be the case. The lecturer then used the responses from the students in the lecture to conclude that the processes in a recipe text were all action processes, which had been foregrounded at the beginnings of sentences to ensure that the reader focused on the actions they needed to undertake to complete the recipe successfully. The lecturer then presented a short paragraph from a narrative and the students were again asked to consider the kinds of processes and where they were situated. Their observations from this second text were then contrasted with their observations from the first text. Through discussion, the lecturer helped the students to make conclusions about how the patterns of processes will vary according to the kind of text being produced and its purpose.

Tasks designed for tutorials always involved the application of knowledge about language. Each tutorial, the pre-service teachers worked with peers and a tutor to use part of their growing knowledge about language to analyse language use in texts. For example, in one tutorial the tutors gave out copies of an exposition text and asked the pre-service teachers to work in small groups to identify the language features associated with the ideas and experiences presented in the text. The pre-service teachers then were asked to discuss how the language choices made by the author to present ideas and experiences helped to fulfil the overall purpose of the text.

Assessment used within the unit was then closely aligned with the emphasis on application of knowledge used within teaching and learning strategies. For one assessment task, the pre-service teachers were provided with 3 texts. The texts had been produced by 3 English language learners in a primary school and were used with the permission of the students. The pre-service teachers chose one of the texts and were asked to complete an analysis using functional grammar. The analysis required that they apply their knowledge from functional grammar to examine how language was being used to present ideas, establish

interpersonal meanings and maintain structure and cohesion. The pre-service teachers were then asked to comment on how the students could improve their use of language to better fulfil the overall purpose of the text. A major section of the final closed-book examination then presented a previously unseen written text, which the pre-service teachers had to analyse, using knowledge of functional grammar, in a detailed extended analytical response. The task included within the final examination is presented as Appendix A.

Methodology

The researchers sought to gain insight into the pre-service teachers' perceptions of their learning experiences, as well as to generate data relating to the extent to which the students had developed deep knowledge about language. The pre-service teachers undertaking the first-year unit on linguistics in an Australian university were invited to participate in the study. First-year students were chosen as the focus of the study because it is in this year that the pre-service teachers undertake a unit dedicated to learning about linguistics. At all stages, the researchers sought to limit the effects that may occur when individuals within a study have the dual role of being both educator and researcher. Both the information letter and the consent form indicated that participation was voluntary and that there was no penalty for not participating in the study. The pre-service teachers were also made aware that they could leave the study at any time without adverse consequences and that the results of the study would not affect the academic results for pre-service teachers within the unit.

Two kinds of data were collected to support analysis of the extent to which the teaching and learning strategies used during the 12-week unit were successful. At the end of the unit, the participating pre-service teachers completed a questionnaire, which provided

insight into their perceptions of the teaching and learning strategies used during the 12-week semester. The content of the questionnaire asked students to reflect on their confidence related to language learning, how useful they perceived particular teaching strategies to be and their perceptions of the various tasks, including assessment, that were used within the unit. For each statement provided, students were required to respond with 'strongly agree', 'agree', 'disagree' or 'strongly disagree'. The questionnaire was designed specifically for this project and a general teaching survey was not used. The pre-service teachers were encouraged to respond honestly to the questionnaire and the researchers were not present during its completion.

The second form of data was generated through an analysis of the extended written response, requiring an application of functional grammar, completed during the closed-book examination. These examination responses were analysed to determine the extent to which deep knowledge about functional grammar was evident. The decision to use an extended written response was based on previous research, which suggested that extended tasks, requiring the application of knowledge, provided the best insight into the extent to which deep knowledge had been developed (Boulton-Lewis 1998). Descriptions of capacities associated with deep and surface knowledge, contained within previous research on learning at the tertiary level, informed the way in which the extended responses were analysed by the researchers. The descriptions were based on the work of researchers who have completed extensive syntheses of studies on deep and surface knowledge at the tertiary level, including Biggs and Tang (2007) and Ramsden (2003). These researchers conclude that deep knowledge involves sophisticated conceptual understanding. Students with this level of knowledge can analyse individual parts and make connections between elements within a coherent theory. While students with surface levels of knowledge may be able to identify individual elements and present rote-learnt responses, learners demonstrating deeper

understanding will use analyses to make justified conclusions and produce structured, coherent responses that draw on all elements and levels of a theory (Ramsden 2003; Biggs and Tang 2007). Students developing deep understanding at the tertiary level will constantly demonstrate surface level knowledge, such as being able to identify an element accurately, but will readily move beyond this to present more generalised and abstracted forms of understanding that include sophisticated connections between different aspects of theory and bodies of knowledge (Ramsden 2003; Webb 1997).

The concepts of deep and surface knowledge used in this study, as well as the previously cited research from higher education, refers to the kinds of understanding that can occur and not to the inherent capacities of learners. Some applications of the research into deep and surface knowledge have included the labelling of students, where the assumption is made that some students have innate capacities to work at either a deep of surface level (Biggs and Tang 2007; Haggis 2003). In this study, the researchers took the position that all students, given certain kinds of learning opportunities, can develop deep levels of understanding.

Once the researchers had identified the key elements of deep and surface knowledge at the tertiary level from previous research, they applied the elements to the learning about functional grammar undertaken by the pre-service teachers. Descriptions of how particular kinds of knowledge would appear when applying a functional model of language to a text were connected to specific features of deep and surface knowledge to form a framework that could be used by the researchers to analyse the extended examination response. The framework was then used to assess the extent to which the students moved beyond surface levels of knowledge to deeper understanding. One of the researchers did all of the analyses to ensure that there was a consistent approach across all the work samples. Frequency data were collected for specific elements of the framework. Descriptive statistics were then generated

from the frequency data. For data analysis, pre-service teachers who demonstrated at least one of the elements of deep knowledge were counted as a student able to move beyond surface knowledge. If the pre-service teachers demonstrated none of the elements of deep knowledge they were included within the group of learners only demonstrating surface knowledge.

Table 1: Framework used to analyse the extent to which deep knowledge about the functional model of language had been developed

Evidence of deep knowledge - based on a synthesis of the work of Biggs and Tang (2007) and Ramsden (2003)	Evidence of deep knowledge about functional grammar in the extended examination response
• Link between parts and levels of a system	• Identify the type of text through the language being used • Explain how specific language features are used to achieve different kinds of meanings within a text • Explain that the specific language choices used to achieve ideational, interpersonal and textual meanings within a text are affected by context
• Identify patterns in detail that are informed by theory	• Use detailed knowledge of language features to discuss how the patterns of language within a text achieve meaning for a specific context
• Apply theory in a new situation to a new problem	• Analyse accurately and in detail a previously unseen text in a closed-book examination situation
• Use theory to analyse	• Apply knowledge of language to pull apart elements of a text
• Make informed generalisations	• Use elements of language from the text to make general comments about the text and its context
• Use evidence to support conclusions	• Refer correctly to elements of language from the text to support conclusions about the text
• Develop hypotheses	• Hypothesise about the creator, context and situation of the text based on a detailed analysis
• Compare and contrast	• Discuss how the language choices within the text would be

	similar/different if the context and situation of the text were to change
• Explain causes	• Explain why specific language choices were made by the creator of the text
Evidence of surface knowledge - based on a synthesis of the work of Biggs and Tang (2007) and Ramsden (2003)	Evidence surface knowledge about functional grammar in the extended examination response
• Identify and label parts	• Use knowledge of language features to identify and label a few parts of the text correctly
• Describe parts of a theory	• Present unrelated descriptions of parts of the language theory
• Present definitions	• Present definitions with little application to the text
• Repeat simple procedures	• Present rote learnt responses with little connection to the text

This framework for analysing the extent to which pre-service teachers moved beyond surface knowledge was also used to provide descriptive statistics that could be used as comparison data. Examination responses from a cohort in the previous year were also analysed. The learning experiences of this previous cohort of students had not involved an extensive emphasis on application of knowledge. These students also had to analyse a text in the final examination using their knowledge of functional grammar, but the lectures, tutorials and other assessment tasks that they had experienced in the semester did not involve multiple opportunities to apply their learning. Data generated from analysing the examination responses (N=56) of this first cohort could then could be compared with the results for the second cohort of students who experienced an emphasis on application of knowledge within the teaching and learning of the linguistics unit.

Results

Results from the Questionnaires

Fifty-three pre-service teachers enrolled in the first-year linguistics unit agreed to complete questionnaires based on their learning experiences. Data from the questionnaire provide insight into the perceptions pre-service teachers had of their learning about language. Cronbach's Alpha was used to measure the questionnaire's reliability. The result of 0.78 suggests that the pre-service teachers' results were internally consistent across the items in the questionnaire. Sixty-two per cent of the pre-service teachers indicated that they did not feel confident about their knowledge of language at the beginning of the unit. Thirty-eight per cent of the pre-service teachers felt some confidence. No students reported that they felt a high degree of confidence at the beginning of the unit. When asked if they felt confident about their knowledge of language at the end of the unit, 24% felt very confident, 74% felt some degree of confidence and 2% did not feel confident.

The pre-service teachers were also asked to evaluate the teaching and assessment strategies used in the unit. Their responses to questions about the pedagogies used have been summarised in the table below.

Table 2: Pre-service teacher responses to statements about teaching and assessment strategies used in the 12-week linguistics unit

Teaching and assessment strategies	% of pre-service teachers (N=53)			
	Strongly agree	Agree	Disagree	Strongly disagree
Lectures assisted me to develop my knowledge of language.	32	68	0	0
Tutorials assisted me to develop my knowledge of language.	51	43	6	0
Working on tasks to analyse and interpret texts assisted me to develop my knowledge of language.	36	62	2	0
Working with peers assisted me to develop my knowledge of language.	45	51	2	2
Preparing for the final examination assisted me to develop my knowledge of	58	38	4	0

language.				

Responses to the questionnaires reveal the large extent to which the pre-service teachers valued opportunities to apply their knowledge about language. Ninety-eight per cent believed generally that tasks requiring application of the theory of language assisted them to develop their knowledge of language. All of the students felt that the lectures had supported their acquisition and development of knowledge about language. Ninety-four per cent of the students felt that they benefited from tutorials that consisted of activities requiring application of knowledge with the assistance of a tutor. Ninety-six per cent of the students believed opportunities to work with peers to apply their knowledge helped them to deepen understanding. The same percentage of students also felt that preparing for a final examination, with an emphasis on applying knowledge about functional grammar to analyse a written text, supported their learning.

Results from the Analyses of the Extended Responses from the Closed-book Examination

Appendix C includes models of expected responses that the pre-service teachers could have made based on the content taught during the semester. The model responses provide a reference point for the results that are presented in this section and the discussion of the results that follow.

Of the pre-service teachers who received multiple opportunities to apply their learning during the semester, 79% (N=42) demonstrated deep knowledge about language within their extended examination responses, while 21% (N=11) revealed only surface levels of knowledge. These results can be contrasted with those for the first cohort of students who did

not have extensive opportunities to apply their knowledge. Of this cohort, 54% (N=30) demonstrated deep knowledge, while 46% (N=26) demonstrated surface knowledge.

All of the pre-service teachers in the first and second cohorts who revealed some depth in their understanding of the language theory could analyse accurately and in detail a previously unseen text in a closed-book examination situation. These pre service teachers could apply their knowledge to identify language features and complete accurate analyses by pulling apart elements of the text. Most of the students demonstrating deep levels of knowledge in the second cohort (95%, N=40) could then use identified examples to support accurate conclusions about language use in the text. For example, one student concluded correctly that '[t]he modality of this text is very certain which is evident through language choices like *extremely important*, *I believe* and *I will*.' Another student presented the accurate conclusion that '[t]here is some use of circumstances within the text. The author states, *In the 1990's* and *In the next few years* all prime examples of circumstances.' In contrast, only 77% (N=23) of the pre-service teachers in the first cohort demonstrating elements of deep learning could use identified examples to make accurate conclusions about language use in the text.

Forty-eight (N=20) per cent of the pre-service teachers in the second cohort demonstrating deep knowledge in their responses went further than identifying types of language features and making a conclusion about language use in the overall text. These students could use their theory to identify patterns in language use throughout the text and discuss how these patterns helped the text to achieve meaning in a specific context. For example, some of these pre-service teachers discussed how the theme had been foregrounded throughout the text and how this supported the main argument being presented. Only 33% (N=10) of the students in the first cohort exhibiting deep learning could do this.

Almost all of the students demonstrating deep levels of understanding in the second cohort found it easy to use their theoretical knowledge to come to specific conclusions about the use of language in the examination text and to support their assertions with a number of examples. However, fewer of the students could use evidence to make more general comments about the text and its context. Creating broader generalisations required that the students have a deep understanding of different levels of the theory of language. They needed to be able to move from specific identification of language features to a broader knowledge of how contexts can affect the content of texts. Only 48% (N=20) of the students demonstrating deep understanding could do this. For example, one student moved beyond the simple conclusion that participants had been used throughout the text and was able to connect the kinds of participants with the broader nature and context of the text. In their extended response, the student wrote '[t]he participants named throughout the piece are *Ballarat's country communities*, *local councils*, *the state government* and *local residents of Western Victoria*; creating a close to home feeling to aid the author in acquiring the reader's agreement and support to their cause.' In another response, a student identified correctly the imperative mood of the text and connected this technique to the author's context of wanting improved transport services in regional Victoria. Students within the first cohort demonstrating some deep learning in their responses generally struggled to connect ideas from different levels of the language theory. Only 20% (N=6) of these students could move from specific identification of language features to generalising about the text and its context.

Students who could make informed generalisations about the text usually also included explanations about why the author of the text had made specific language choices. Fifty-two per cent (N=22) of the students, demonstrating some deep understanding in their responses in the second cohort, included causal explanations about the author's choice of specific language features. One student explained how '[l]exical cohesion has been used

throughout the text to minimise repetition, for example *Western Victoria*, *Country Victoria*, *Melbourne* and *Ballarat region*. Finally reference items have also been utilised throughout the text to minimise repetition, for example the word *it* refers to other ideas in the text or sentence, which have previously been stated.' Another student commented that 'the author has foregrounded the theme of the text at the beginning of the paragraph which is the *trains to Melbourne* and the rheme has demonstrated, clarified and emphasised the author's opinion.' In the first cohort of pre-service teachers only 30% (N=9) of those exhibiting elements of deep learning provided these kinds of causal explanations. Some students in the second cohort demonstrated even deeper knowledge of the language system by using detailed analyses of the text to hypothesise about the author and their context. Thirty-three per cent (N=14) of the students demonstrated this capacity. One student used their analysis of language in the text to hypothesise that 'the author of this text might be a politician and possibly the shadow transport minister, or the leader of a lobby group.' None of the pre-service teachers in the first cohort of students demonstrated evidence of this.

Students demonstrating sophisticated levels of understanding about a theory can move easily between the different parts and levels of a system. Only a small number of the pre-service teachers in the second cohort demonstrated capacities to move constantly between all levels of the language theory during their extended responses. Forty-eight per cent (N=20) of these students linked specific language features found within the examination text with the three ways of making meaning included within the system of functional grammar compared with 20% (N=6) in the first cohort. One student in the second cohort linked the use of noun groups with the ideational meanings of the text, explaining that '[t]he ideas of the text are further emphasised by the noun groups which are both simple, *the trains to Melbourne*, and complex, '*[l]ocal residents of Western Victoria*.' Another student explained '[t]he tenor or interpersonal meanings of the text have been emphasised through the imperative and

declarative mood.' Some students in the second cohort also connected analyses of language to the overall structure and cohesion of the text. For example, one student commented '[t]here is a lot of lexical cohesion surrounding the text, which helps minimise repetition and gives the text a sense of cohesiveness'. Fewer students in both cohorts (33%, N=14 and 6%, N=2) could make links with the next level of the language system. Only some of the pre-service teachers could then explain how the ideational, interpersonal or textual meanings were affected by the broader context of the text. One student in the second cohort demonstrated an ability to move between all levels of the language system when explaining '[i]nterpersonal meaning is clear within this piece. Modality has been used clearly to emphasise certainty and obligation. Certainty can be seen in the word *extreme*, whereas obligation is clear through *must begin* and *need to*. The author of the text is clearly passionate about the topic, which is emphasised in words like *must* and *extreme*. The overall mood is declarative as it states information, but mainly imperative as the author is urging for action to be taken immediately.'

Only 21% (N=9) of the students demonstrating deep knowledge in the second cohort made links between every element of the language system to identify the text as an exposition. Only 2 of the students used knowledge of theory to go beyond the immediate requirements of the task to compare and contrast their knowledge of the language patterns in a range of texts and contexts to discuss how a change in context could affect the exposition text provided in the examination. One of the 2 students commented that '[i]t does not strike me as something written by an everyday person or even a commuter as language like *I will say this at every opportunity* or stating that *local residents need to support the cause* allude to language of a person in a position of power. It has the language perhaps also of a speech.' Within the first cohort, 10% (N=3) of those demonstrating deep learning identified accurately

the kind of text. None of the students in the first cohort demonstrated a capacity to discuss how changes in context could affect the given text.

Eleven (21%) of the 53 students in the second cohort did not provide any evidence of deep knowledge compared with 46% (N=26) in the first group. Of these 11 students in the first cohort, 10 could use some knowledge of specific language features to identify and label a few parts of the examination text. However, these students did not then move from specific individual examples to making conclusions about language use within the text. For example, one student identified that '[t]here is nominalisation within this text such as *the argument*. There are also noun groups such as *the transport system of Victoria*' but did not move to broader conclusions about the use of these features in the text. Similarly, in the first group of students, most (N=24) could use their knowledge to identify and label parts of the given text, but these students did not make general conclusions about language use. Six of the students in the first cohort and 15 in the second could provide some definitions of language features, but these students were not always able to apply these during an analysis of the text. For example, one student in the second cohort commented that '[t]he mood of the piece is declarative because the writer is giving information', but they could not explain that the text in the examination moved between declarative to imperative moods or how the declarative mood supported the purpose of the text. Two of the 11 students in the second cohort could describe parts of the language theory, but they could not make any connections between the different levels of the system. Nine of the students in the second cohort and 18 in the first presented rote learnt responses, at times, that were not relevant to the unseen text provided within the examination.

Discussion

Previous research in tertiary learning environments highlights that deep knowledge will be generated when students are provided with a knowledge base, as well as constant opportunities to apply the learnt information (McKay and Kember 1997; Biggs and Tang 2007; Ramsden 2003). Overwhelmingly, the pre-service teachers in this study valued the pedagogies used within the linguistics unit that constantly moved between the transmission and application of knowledge. All of the students valued the lectures, which included the transmission and application of knowledge within the discipline of linguistics. The small tasks, inserted throughout the lecturers, provided opportunities for students to discuss an aspect of language, while they used the knowledge to complete quick analyses of written texts. The pre-service teachers also valued highly the opportunities to apply their knowledge in tutorials. They felt that working with a tutor and peers during their application of knowledge to complete textual analyses supported their understanding of language theory. However, one limitation of this study is that it involved first-year students who were asked to make judgements about their learning experiences without having had a lot of exposure to teaching and learning in a tertiary context. While these perceptions of a first-year cohort are important, it would be interesting to explore if pre-service teachers towards the end of their degree felt the same way about opportunities to apply knowledge in a discipline context.

An emphasis on application in assessment also helped the pre-service teachers to develop deep knowledge about language. The pre-service teachers in the second cohort were provided with two assessment opportunities to apply their knowledge, including a text analysis task in the semester and the extended response within the examination. Both tasks required that students apply their theoretical understandings to create a new analysis of a text. The tasks did not reward rote learning and asked students to demonstrate deep understanding of how knowledge related to a theoretical framework is integrated. The findings presented here within the context of teacher education support the conclusions being generated within

general research on tertiary education. Deep understanding can only occur when teaching practices and assessment are aligned and aim to move beyond surface knowledge (Ramsden 2003; Biggs and Tang 2007; Boulton-Lewis 1998; McKay and Kember 1997; Saltmarsh and Saltmarsh 2008; James, Hughes and Cappa 2010).

Comparisons between the first and second cohort of students indicate that the teaching, learning and assessment opportunities provided during the semester for the second group of pre-service teachers supported their progress towards deep understanding. Twenty five per cent more students in the second cohort demonstrated deep knowledge within the extended examination response. Of the students demonstrating some deep understanding, more pre-service teachers in the second cohort exhibited sophisticated knowledge, such as the capacities to identify patterns, generalise, hypothesise and move confidently between levels of the language system within their analyses.

The results of this study have implications for the design of tasks that ask students to apply knowledge within discipline contexts. Most of the students who participated in this research demonstrated deep levels of learning by applying detailed parts of a knowledge system to analyse a new problem in a closed-book examination. They could then use their analyses of specific aspects to generate some accurate conclusions about language use in the text. However, fewer students demonstrated capacities to create analyses that incorporated all levels of a conceptual framework. Students who develop deep understanding of the content of a discipline can manipulate detail within different levels of conceptual frameworks and make the connections required to apply knowledge effectively (Ramsden 2003; Biggs and Tang 2007). In this instance, most of the students could make correct conclusions about uses of language within a text, which were supported by detailed evidence, but fewer students could deepen these analyses through applying understandings of other levels of the language system. For example, some of the students could not link comments about specific language

features to the three main ways in which authors can make meaning within texts, or to the conceptual notion that texts are influenced by broader contexts. These findings can be connected with the way in which application tasks were designed as the unit progressed. The broad theory, with all its interconnected levels, was introduced initially and then the focus of learning moved on to the details of the system. Assumptions had been made that the students were placing specific elements of the system within broader conceptual understandings as the course progressed. However, many students would have benefitted from tasks throughout the semester that provided greater prompts for them to apply knowledge about specific elements of the theory, while also making constant links between the different levels of the conceptual framework. This kind of task design would have supported even further the development of deep knowledge by strengthening students' capacities to integrate elements of the language theory.

For the majority of the pre-service teachers, a 12-week unit on linguistics, with a focus on the application of knowledge to create analyses, supported aspects of deep rather than surface knowledge of a theory of language. However, a small group of students within the unit did not move beyond surface levels of understanding. The emphasis on application had supported their understanding to some extent; almost all of these students could apply their knowledge to identify a few of the language features within a text. The importance of this knowledge should not be underestimated. The pre-service teachers who demonstrated elements of deep knowledge could only do so because they had mastered quickly and easily the aspects associated with more surface forms of understanding. Tertiary students who demonstrate deep knowledge are constantly also employing understanding usually identified in higher education literature to be at a surface level (Webb 1997; Marton et al. 1993 cited in Webb 1997). The findings presented here suggest that some students would benefit from more time and practice working with a new complex body of knowledge. For almost all the

students in the first-year linguistics unit, functional grammar was new information, which they had not encountered before, and they did not feel confident about their own understanding of language. The students demonstrating surface levels of knowledge had mastered some of the basics associated with the functional model of language, but they needed more learning opportunities, including application tasks. One implication of this study is that units beyond first year need to revisit theories that are deemed to be of high importance to the profession and support students to maintain surface knowledge and develop deep understanding.

The unit on linguistics, with an emphasis on application, made a significant difference to the degree of confidence that the pre-service teachers felt about their knowledge of language. Over half of the pre-service teachers indicated that they did not feel confident about their knowledge of language at the beginning of the unit. By the end of the unit, only 2% of the pre-service teachers felt this. However, a limitation of this study is that the students were only asked to comment on their levels of confidence in the questionnaire at the end of the linguistics unit. The question relating to their feelings at the beginning of the unit asked them to remember back to that time and it was not asked before the students undertook the unit. The experiences of the pre-service teachers during the unit on linguistics may have affected the way in which they reported their levels of confidence at the beginning of the learning experience. Trialling the questionnaire before its use may also have strengthened the design of this study.

Degrees related to the professions, including teacher education, often consist of units focusing on content knowledge, as well as those that are more related to the development of specific practices in professional contexts. Successful teacher education programs are committed to providing pre-service teachers with theoretical content knowledge that is deeply understood and can be applied flexibly to teaching practices in a diverse range of contexts

(Darling-Hammond 2006; Loughran 2006; Zeichner 2008; Milner 2005; Poplin and Rivera 2005). The findings of this study indicate that conceptions of application from general literature on learning in tertiary environments can be used successfully in teacher education degrees where units do not have immediate connections with practice. Designing curriculum and learning experiences that enable pre-service teachers to apply their knowledge constantly within discipline contexts, such as linguistics, will support deep knowledge within those units that do not have immediate links to using theory in practice.

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Appendix A: Examination question requiring application of knowledge of functional grammar

> Read the following text and then use Systemic Functional Linguistics (functional grammar) to analyse the ways that language is working within the text. **Write your answer in the writing booklet provided**.

Text:

I believe that it is extremely important that the trains to Melbourne are much more frequent. The argument against increasing the number of trains is really about money and it is not about the welfare of country communities. The local councils in the Ballarat region must begin to take more of a role in this debate. In the 1990s, there was no need for more trains, since the population of western Victoria was not as large as it is today. Now, there is massive population growth and the transport system of Victoria must keep up with the changes. I believe that the state government must take action in the next few years and I will say this at every opportunity. Local residents of Western Victoria need to support this cause, otherwise country Victoria will be left behind.

Appendix B: The questionnaire

Questionnaire for pre-service teachers

	Strongly agree	Agree	Disagree	Strongly disagree
When I began the unit I felt confident about my knowledge of language.				
At the end of the unit I feel confident about my knowledge of language.				
Lectures assisted me to develop my knowledge of language.				
Tutorials assisted me to develop my knowledge of language.				
Working on tasks to analyse and interpret texts assisted me to develop my knowledge of language.				
Working with peers assisted me to develop my knowledge of language.				
Preparing for the final examination assisted me to develop my knowledge of language.				

Appendix C: Possible responses to the examination question based on learning about the functional grammar model in the semester

Content covered during the semester related to functional grammar	**Possible responses to examination text based on learning in the semester**
Particular kinds of texts are created within specific contexts for specific purposes.	• This text is an exposition with the explicit purpose of persuading the audience on a topic. The purpose of the text is related to its context. The broad context is the perceived lack of trains between Ballarat and Melbourne. The author wants to convince the audience that more trains are needed. • The language choices made by the author of the text support the key purpose of persuasion. • The choices of language suggest that the author is involved with the issue and is in a position to lobby for support.
Language choices are made to express ideas, define relationships and generate cohesion within texts.	• This author has used specific language choices to express ideas, establish interpersonal relationships and to generate cohesion within the exposition. These are the 3 ways in which meanings can be created within a text.
Participants	• The participants include the people, things, issues, concepts that may be involved in a text. The participants in this text are both human and non-human (eg *trains, local residents of Western Victoria*). Some of the participants include abstract concepts, (such as *the argument and massive population growth*), while others are more concrete. Most of the participants are specific. These participants in the text are important for presenting the key ideas, as well as indicating the people who are involved. The author of the text has chosen the participants carefully to ensure that the elements of the argument are clear and the text is persuasive.
Noun groups	• Noun groups may be simple or complex. Complex noun groups will be used when an author wants to pack information within a sentence. This author uses both simple and complex noun groups (eg *country Victoria, the local councils in the Ballarat region*). Often the noun groups used in this text are complex because the author wants to present complex ideas and detail within a short text. The author also wants to be clear and specific. This means that describers and classifiers have been used

	within the noun groups.
Nominalisation	• Nominalisation is where words, often verbs and adjectives, have been turned into nouns. Nominalisation is often used in factual texts, like expositions. There is nominalisation in this text (eg *argument, population*). The use of nominalisation in the text helps the author to present the complex, and often abstract, ideas related to the argument.
Processes	• There are 4 main types of processes that may be chosen for use within a text. The 4 types include action, mental (sensing), saying and relational. Many of the processes in this text are relational (eg *is, are*) and these are used by the author to indicate how parts of the argument being presented are connected. The author also uses mental processes (eg *believe*), which help the author to express their own opinion in the argument. The emphasis on relational and mental processes is typical of an exposition. There are few action processes. One appears at the end of the text (*to support*), which is used by the author to urge action from the audience.
Circumstances	• Circumstances are used by authors to provide detail and additional information within a text. This information may be about time, place, manner, cause or accompaniment. The author of this text uses a number of circumstances to provide details that are important to the argument being presented. For example, the author explains that there was not as much demand for trains *in the 1990s*. The specific details provided through circumstances help the author to be convincing and persuasive.
Language use to establish a relationship between the author and the topic, as well as the author and the audience	• Language choices in a text will always establish a relationship between the author and the topic, as well as the author and the audience. In this text, the language choices reveal that the author is passionate about the topic. The author has chosen to include themselves within the text as a participant. This enables the author to give personal opinions (eg ***I*** *believe that the state government must take action in the next few years and* ***I*** *will say this at every opportunity*.) The author is presenting their own views as part of their strategy to persuade the audience. The author hopes that the personal voice used at times will help to convince the audience. However, the author is also hoping to persuade the audience by appearing, at times, as an

	objective expert through the use of complex noun groups and nominalisation. The author in these instances is hoping to persuade the audience by appearing knowledgeable about the topic and by giving the appearance that their opinions are based on fact. At other times, the author chooses to use noun groups that will be inclusive of the audience, such as *country communities*. The author also hopes to establish a relationship with the audience by presenting the information with high degrees of certainty and obligation. This refers to modality within a text. The author does this through modals like *will* and *must*. The author also establishes relationships with the topic and audience by writing in an imperative mood. This mood is suited to expositions that are demanding that people act, like in this example where the author is demanding improved train services for a country region. At times, the mood is declarative, with information being presented. This declarative mood also supports the key purpose of presenting an argument.
Paragraph previews/topic sentences and foregrounding of theme	• Paragraph previews (topic sentences) are used to give structure to a text. These are extremely important in expositions, where an author wants to be clear about the central theme of their argument. The author here has used a clear topic sentence to begin, where the central theme of their argument is presented. The theme of the text is then often foregrounded in sentences throughout the paragraph. The rheme then provides supporting information and clarifies points.
Reference items	• Reference items have been used throughout the text to avoid repetition and to provide cohesion to the argument being presented. For example, the author uses the words *this* and *it* to stand for complex noun groups. However, not many reference items are used because the author wants to be specific and clear. This helps to present a complex argument.
Lexical cohesion	• The author uses lexical cohesion to avoid repetition in the text and to present ideas in a few different ways (eg *country communities, country Victoria, western Victoria*). Presenting ideas in a few different ways helps the author to present their argument in a coherent way. This is important in expositions.
Text connectives	• An author will use text connectives to provide

	cohesion in a text. These language features are important in expositions as they help to present a coherent argument. This author has used time connectives to emphasise the sequence of events related to the argument being presented (eg *in the 1990s, now*).